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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/689,043

10/21/2003

Li Yao

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EXAMINER

ALANKO, ANITA KAREN

ART UNIT

PAPER NUMBER

1792

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DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/689,043	Applicant(s) YAO ET AL.	
	Examiner Anita K. Alanko	Art Unit 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 April 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 3-10, 14, 16-19 and 21-33 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 3-10, 14, 16-19 and 21-33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 3-10, 14, 16-19, 21-33 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In claims 14 and 27, the term “substantially free” is a relative term which renders the metes and bounds of the claim unclear. How substantially free of HDA must the composition be, 49%, 25%, 75%??

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 3-10, 14, 16-19, 21-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsai et al (US 7,008,554 B2) in view of Sun et al (US 6,858,540 B2) and Fang (US 6,347,978 B1).

Tsai discloses a method comprising:

providing a substantially abrasive-free (since abrasives are optional, “may further include” is interpreted to mean that it may not include, col. 6, lines 17-18, alternatively, or the cited range of less than 1 wt% overlaps with Tsai’s range of 0.01-2 wt%, col.7, line 67) CMP composition that includes a hydroxylamine derivative (1%, col.6, lines 49-51), a corrosion inhibitor (0.02% BTA, col. 7, lines 50-60), and water (col.8, line 8);

contacting the composition with a substrate 400 having a metal oxide surface 410, barrier layer 412 and metal layer 413 (col.9, line 64-col.10, line 34);

chemically mechanically polishing the substrate by contacting the substrate surface with a polishing pad 300 at an applied pressure of 2 psi (including a range of 1-2 psi, col.6, lines 6-7) and by moving the pad in relation to the substrate,

wherein the removal rate of the barrier layer is greater than about 500 Å/min (700 Å/min col.10, line 49, or in the range of 300-500 Å/min col.8, lines 55-56),

the removal rate of the metal oxide layer is 50 Å/min (col.8, line 57, which is higher than that cited), and

the removal rate of the metal layer is less than 250 Å/min (since a selectivity of at least 5:1 is achieved, the metal polishing rate is one-fifth of the barrier layer polishing rate, col.8, line 52).

Tsai fails to disclose the type of polishing pad. Sun teaches that a useful pad for polishing includes a fixed abrasive pad (col.8, lines 14-18). It would have been obvious to one with ordinary skill in the art to use an abrasive polishing pad in the method of Tsai because Sun teaches that they are useful for polishing barrier layers.

Further as to claims 14, 27 and 28-33, Tsai fails to disclose that the composition is substantially free of HDA. Fang teaches that in HDA compositions for polishing, that HDA additives include either HDA or derivatives of HDA including nitrate and sulfates salts (col.3, lines 14-27). Fang teaches a finite list of HDA or its derivatives. It would have been obvious to choose a salt such as HDA sulfate or HDA nitrate in method of Tsai because Fang teaches that they are useful alternatives for HDA in polishing compositions. Still further, because Fang teaches a finite list of identified, predictable solutions, it is obvious to choose to try the sulfate and/or nitrate salts for the HDA polishing compositions of Tsai in order to provide effective polishing solutions.

As to amended claims 14 and 27, Tsai fails to disclose that the composition includes a two-carbon atom linkage alkanolamine compound. Scott teaches that a useful compound to enhance polishing of HDA (col.18, lines 23-27, 51-52) slurries is to include an alkanolamine (col.36, lines 29-32). It would have been obvious to include an alkanolamine with a two-carbon linkage in the method of Tsai because Scott teaches that they are useful to add to HDA polishing methods to enhance polishing. The method of Tsai modified by Scott would have been obvious because adding polishing enhancing agents for HDA polishing was recognized as part of the ordinary capabilities of one skilled in the art. Scott teaches enhancing agents for similar methods

as Tsai, and adding polishing enhancing agents would have yielded the predictable result of enhancing polishing because of the similar chemistries involved.

Tsai also fails to disclose a removal rate of the metal oxide of less than 10 Å/min. Rather, Tsai discloses a removal rate of the metal oxide layer is 50 Å/min (col.8, line 57). However, different materials polish at different rates under different process conditions, and different barrier layers, metals and metal oxides etch at different rates. It is obvious to vary the composition and method for best results according to the desired polishing characteristics. Since the modified method of Tsai is very similar with overlapping parameters, concentrations and ranges as the instant invention, it is obvious to vary the composition to achieve the cited metal oxide polishing rate in order to optimize the process for best results.

As to claims 24-25, Tsai teaches a range of pH including 3-7 (col.7, lines 3-10). Since Tsai teaches a range, Tsai also teaches that the pH may be changed according to the desired polishing results. The pH affects the reaction kinetics. It would have been obvious to one with ordinary skill in the art to vary the pH to the range cited in the modified method of Tsai because the pH appears to reflect a result-effective variable which can be optimized. See MPEP 2144.05 IIB.

Response to Arguments

Applicant's arguments filed 4/17/08 have been fully considered but they are not persuasive. The amendment about how substantially-free of abrasives the composition is acknowledged, and overcomes any vagueness in that instance. However, "substantially" is also cited with respect to hydroxylamine.

Applicant argues about adding an alkanolamine. In response, Scott is newly cited to teach that adding alkanolamines to polishing compositions is useful to enhance polishing. Applicant has not shown any examples in the specification that compositions with or without alkanolamines yield unexpected results. It is obvious to add polishing enhancing agents, and the amount to which they added is a result-effective variable which can be optimized for best results.

Applicant argues that Tsai does not teach substantially abrasive-free and less than 1wt% abrasive content. In response, Tsai teaches an overlapping range of zero (since it is optional) and 0.01-1 wt% (col.7, line 67).

Applicant argues that Tsai does not teach the metal removal rate. In response, Tsai teaches barrier removal rates (about 500 angstroms/min) and selectivities to metal (copper) polishing of 5:1 or greater (col.8, line 52). If the selectivity is 5:1, a 500 angstrom/min barrier rate would give a 100 angstrom/min metal (copper) polishing rate, which is within the range cited.

Applicant argues that Fang does not teach polishing a substrate with a metal oxide layer surface, etc and Fang is silent about the removal rates of the barrier layer and metal oxide layer. In response, the modified method of Fang teaches these elements as discussed above in the rejection. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The cited art shows methods that use compositions with alkanolamines.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anita K. Alanko whose telephone number is 571-272-1458. The examiner can normally be reached on Mon-Fri until 3:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Anita K Alanko/
Primary Examiner
Art Unit 1792